2008

Virginia Peregrine Falcon monitoring and management program: Year 2008 report

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Recommended Citation:

Watts, B. D., Mojica, E.K. and Padgett, S. M. 2008. Virginia Peregrine Falcon monitoring and management program: Year 2008 report. Center for Conservation Biology Technical Report Series, CCBTR-08-02. College of William and Mary, Williamsburg, VA. 19 pp.

Project Partners:

The Virginia Department of Game and Inland Fisheries
(Wildlife Diversity Program)
National Aeronautics and Space Administration
National Park Service
United States Fish and Wildlife Service
Virginia Department of Transportation
The Nature Conservancy
Dominion
Center for Conservation Biology

Front Cover: Young falcon from the James River Reserve Fleet brood learning to balance at the New River Gorge. *Photo by Gary Hartley, NPS.*

The Center for Conservation Biology is an organization dedicated to discovering innovative solutions to environmental problems that are both scientifically sound and practical within today's social context. Our philosophy has been to use a general systems approach to locate critical information needs and to plot a deliberate course of action to reach what we believe are essential information endpoints.

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EXECUTIVE SUMMARY

The Peregrine Falcon (*Falco peregrinus*) was believed to be extinct as a breeding species in Virginia by the mid-1960s. Intensive management efforts since the late 1970s have resulted in a known breeding population that has now exceeded 21 pairs. However, all the known breeding pairs currently nests on artificial structures and reproductive performance continues to be erratic. The primary objective of this program is to continue to monitor population trends and to improve reproductive performance through active management. The ultimate goal of the program is to recover a population that is self-sustaining.

The Virginia breeding population supported 21 known pairs during the 2008 breeding season. Since 1982 the population has exhibited a steady recovery with an average doubling time of 5.4 years. Fifty-three nesting structures were surveyed for Peregrine Falcon activity during the breeding season. The survey documented 21 resident pairs. Nesting structures included 12 peregrine towers, 5 bridges, 1 shack remnant on the seaside of the Delmarva, 1 high-rise building, 1 reserve ship, and 1 power plant stack. Twenty falcon pairs made breeding attempts producing 76 eggs and 47 chicks that survived to banding age. Reproductive rate was 2.2 chicks/occupied territory and 2.3 chicks/active territory. Of 16 clutches that were followed completely from laying to fledging, 35 of 57 (61.4%) eggs hatched. Of these 35 chicks, 33 (94.3%) survived to banding age and 25 (71.4%) fledged successfully.

Twenty-eight young falcons representing more than 60% of the chicks produced in the state were translocated from the coast to the mountains during the 2008 breeding season. This included 12 females and 16 males. Sixteen of these chicks originated on bridges that have a history of poor fledging success. The remaining 12 chicks were from towers along the Delmarva Peninsula (8) and a ship in the James River Reserve Fleet (4). Birds collected from territories were transported to Hawksbill in Shenandoah National Park, the New River Gorge National River, and Breaks Interstate Park. Nine birds were hacked at Hawksbill, and 13 at the New River Gorge, and 6 at Breaks Interstate Park. The management strategy initiated in 2006 to utilize productivity along the Delmarva to fuel targeted hacks in the mountains was continued in 2008. This strategy meets the objective of both repopulating the mountain range and reducing impacts to sensitive waterbirds.

BACKGROUND

Context

The original population of Peregrine Falcons in the eastern United States was estimated to contain approximately 350 breeding pairs (Hickey 1942). From published records and accounts, there have been 24 historical Peregrine eyries documented in the Appalachians of Virginia (Gabler 1983). Two additional nesting sites were documented on old osprey nests along the Virginia portion of the Delmarva Peninsula (Jones 1946). Throughout the 1950s, and into the 1960s, Peregrine Falcon populations throughout parts of Europe and North America experienced a precipitous decline (Hickey 1969). A survey of 133 historic eyries east of the Mississippi River in 1964 failed to find any active sites (Berger et al. 1969). The Peregrine Falcon was believed to be extinct in Virginia as a breeding species by the early 1960s.

As part of a national effort to restore the eastern Peregrine population, the Virginia Department of Game and Inland Fisheries, Cornell University, and the College of William and Mary initiated a hacking program for Virginia in 1978. The program involved the release of captive-reared Peregrines with the hope that these birds would re-colonize the historic breeding range. Between 1978 and 1993, approximately 250 young falcons were released in Virginia. Since the close of this program, captive-reared Peregrines have been released on a limited basis within the state. Such releases have involved more targeted projects. Beginning in 2000, wild-reared falcons have been translocated from coastal breeding sites to mountain release sites. Such movements have taken advantage of young produced from sites where fledging success is known to be poor.

The first successful nesting of Peregrines Falcons in Virginia after the DDT era occurred in 1982 on Assateague Island. Since that time, the breeding population has continued a slow but steady increase. The size of the known breeding population within the coastal plain has now exceeded 20 pairs. However, both hatching rate and chick survival remain somewhat erratic. An analysis by the U.S. Fish and Wildlife Service in the early 1990's of addled eggs collected in Virginia, showed levels of DDE, Dieldrin, and egg-shell thinning that have been shown previously to have an adverse impact on reproduction. An additional problem that has been suspected but not fully quantified is that the turnover rate of breeding adults appears to be high. At present, the long-term viability of the Virginia population in the absence of continued immigration from surrounding populations remains questionable. Continued monitoring and management of this population is needed to ensure that the population will continue to recover.

Objectives

The objectives of this project were 1) to track the recovery of the breeding population of Peregrine Falcons in Virginia (both in terms of the size and distribution of the breeding population and the number of young produced), 2) to evaluate the success

of past and present management techniques used with the breeding population, 3) to improve productivity of nesting pairs through active management, and 4) to increase our understanding of Peregrine Falcon natural history in the mid-Atlantic region.

METHODS

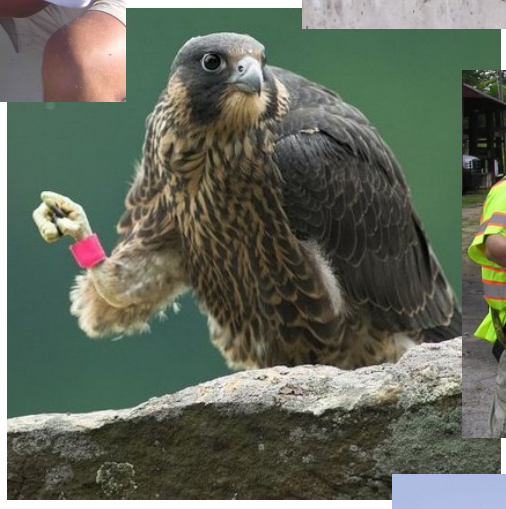
Geographic Focus

In 2008, the geographic scope of this project included breeding locations within the coastal plain, the only known mountain nesting site (Stony Man in Shenandoah National Park), and three mountain hack sites (Hawksbill in Shenandoah National Park, New River Gorge, and Breaks Interstate Park). Most of the effort was focused on the coastal plain where the majority of breeding pairs occur.

Nest Site Surveys

Between 1977 and 2008 more than 60 structures have been established specifically for breeding Peregrine Falcons within the coastal plain of Virginia (Table 1, Figure 1). Nearly all of the structures that survived to the 2008 breeding season were checked for evidence of resident falcons. An initial survey of breeding structures was conducted between 1 March and 30 April. All surveys of towers and boxes along the Delmarva Peninsula and fringe of the western shore were surveyed from the air using a Cessna 172, high-wing aircraft. Fly bys were conducted at low altitude to flush attending adults and to view the inside of nest boxes for activity. The number of adults attending sites and/or activity within the nest box was recorded. Remaining sites on bridges or within urban areas were surveyed on the ground for occupation and activity. Sites that were confirmed to have Peregrine activity were monitored with 2-5 additional ground visits to document breeding activity, to band young and to document fledging success. A breeding territory was considered to be “occupied” if a pair of adult Peregrines was resident during the breeding season. Nests were considered to be “active” if eggs or young were detected (Postupalsky 1974). Complete breeding information (e.g. clutch size, hatching rate) could not be obtained for a small portion of active sites due to poor access. However, fledging rate was determined for all active sites when possible. Nest sites were visited approximately 2 weeks after projected fledging date to determine fledging success. This time threshold was developed from Satellite tracking data (2001-2002) that indicates a pulse of mortality just prior to fledging and in the 2 weeks following fledging (Watts et al. 2002).




Photos from top left to right – Mitchell Byrd and Bart Paxton at Upsher Bay (*Libby Mojica*), Berkely Bridge pair (*Libby Mojica*), Carla Schneider and Libby Mojica at Godwin Bridge (*Adam Duerr*), Norris bridge fledgling at NRG (*Gary Hartley*), Shawn Padgett with bridge crew (*Libby Mojica*), snooper truck under Norris bridge (*Bart Paxton*), Gull Marsh tower (*Libby Mojica*), Libby Mojica and Bryan Watts with VDOT staff on snooper truck (*Carla Schneider*).

Banding

An attempt was made to band all chicks surviving to banding age (21-32 d). Chicks were banded with a U.S. Fish and Wildlife Service lock-on, aluminum tarsal band on the right leg and a bi-colored, green and black, alpha-numeric auxiliary band on the left leg. FWS bands used in Virginia during the 2008 breeding season were anodized green. Band size 6 and 7a were used for male and female chicks respectively. Auxiliary bands were applied with two pop rivets.

Translocations

Over the past several years, some breeding sites on bridges have been known to experience low fledging rates. Observations indicate that losses occur during initial flight attempts or when chicks are near fledging age. Numerous chicks have been lost in the water during early flights when they are unable to fly back up to nest structures. Other chicks have flown down to the roadbed and been killed by automobiles. In order to improve survivorship for high-risk sites, a program was initiated to translocate chicks to mountain release sites. Chicks are typically removed from nest sites, transported to mountain sites, and released using standard hacking techniques (Sherrod et al. 1981). In keeping with the objectives of facilitating the re-colonization of the historic mountain range and reducing the impacts of the breeding Peregrine population on sensitive waterbirds (Long and Watts, unpublished data), chicks were taken from selected nesting sites along the seaside of the Delmarva Peninsula to be hacked from high priority mountain sites.

RESULTS

Site Surveys

Fifty-six nesting structures were surveyed for Peregrine Falcon activity during the breeding season (Table 1). Of the sites with known occupation, 21 supported resident pairs. These included 12 peregrine towers, 5 bridges, 1 reserve ship, 1 power plant stack, 1 fishing shack, and 1 high-rise building (Table 2).

Breeding Results

Virginia supported 21 known breeding pairs of Peregrine Falcons during 2008 (Figure 1). After young were translocated from the Berkeley Bridge, the pair laid a second brood of 3 eggs and raised one young at the Jordan Bridge. Another pair at Possum Point Substation was not documented to produce eggs because the pair arrived at the nest box late in the breeding season. Therefore there were only 20 active territories (Table 2).

Table 1. Catalog of nesting structures established for Peregrine Falcons in Virginia (1977-2004). Table gives year of establishment and whether or not the site was checked for Peregrine Falcon activity during the 2008 breeding season. Dashed lines indicate that the structure is no longer present.

Site Code	Location Description	Structure Type	Year Est	Checked 2008
VA-PEFA-01	Fisherman's Island Tower	Peregrine Tower	1980	Y
VA-PEFA-02	Cobb Island Tower	Peregrine Tower	1978	Y
VA-PEFA-03	Hog Island Tower	Peregrine Tower	1977	-----
VA-PEFA-04	Paramore Island Tower	Peregrine Tower	1982	-----
VA-PEFA-05	Metompkin Island Tower	Peregrine Tower	1982	Y
VA-PEFA-06	Wallops Island Tower	Peregrine Tower	1981	Y
VA-PEFA-07	Chincoteague Tower	Peregrine Tower	1979	Y
VA-PEFA-08	Great Fox Island Tower	Peregrine Tower	1981	Y
VA-PEFA-09	Watts Island Tower	Peregrine Tower	1997	Y
VA-PEFA-10	Finney's Island Tower	Peregrine Tower	1997	Y
VA-PEFA-11	Tangier Island Water Tower	Nest Box	1999	-----
VA-PEFA-12	Hyslop Marsh Tower	Peregrine Tower	1995	Y
VA-PEFA-13	Saxis Marsh N. Tower	Peregrine Tower	1996	Y
VA-PEFA-14	Saxis Marsh S. Tower	Peregrine Tower	1998	Y
VA-PEFA-15	Parker Marsh Tower	Peregrine Tower	1997	Y
VA-PEFA-16	Elkins Marsh Chimney	Nest Box	1995	Y
VA-PEFA-17	Elkins Marsh Shack Tower	Nest Box/Tower	1997/2004	Y
VA-PEFA-18	Wachapreague Shack Tower	Peregrine Tower	1994/2000	Y
VA-PEFA-19	James River Ghost Ship 1	Moth Ball Fleet	1987	-----
VA-PEFA-20	Coleman Bridge Box	Nest Box	1989	Y
VA-PEFA-21	Norfolk Southern RR Bridge	Bridge	1992	Y
VA-PEFA-22	James River Bridge	Nest Box	1991	Y
VA-PEFA-23	Berkley Bridge	Nest Box	1996	Y
VA-PEFA-24	Benjamin Harrison Bridge	Nest Box	1996	Y
VA-PEFA-25	Mills Godwin Bridge	Nest Box	1996	Y
VA-PEFA-26	West Norfolk Bridge	Nest Box	1996	Y
VA-PEFA-27	Norris Bridge	Nest Box	1989	Y
VA-PEFA-28	Little Stony Man, SNP	Natural Cliff Face	-----	Y
VA-PEFA-29	Old Rag, SNP	Natural Cliff Face	-----	Y
VA-PEFA-30	Back Bay Tower	Peregrine Tower	1982	-----
VA-PEFA-31	Plum Tree Island Tower	Peregrine Tower	1998	-----
VA-PEFA-32	Plum Tree Island Box	Nest Box	1990	Y
VA-PEFA-33	Saxis Marsh W. Tower	Peregrine Tower	1998	Y
VA-PEFA-34	Mockhorn Island Tower	Peregrine Tower	1997	Y
VA-PEFA-35	Tangier Island Tower	Peregrine Tower	2000	Y
VA-PEFA-36	Upsher Bay Tower	Peregrine Tower	2000	Y
VA-PEFA-37	Silver Beach Range Tower	Nest Box	1997	Y

Table 1. Continued

Site Code	Location Description	Structure Type	Year Est	Checked 2008
VA-PEFA-38	Hawksbill Mountain	Natural Cliff Face	-----	Y
VA-PEFA-39	Concrete Ships	Nest Box	1995	Y
VA-PEFA-40	Chesapeake Substation	Nest Box	1998	Y
VA-PEFA-41	Holiday Inn VA Beach	Nest Box	1997	Y
VA-PEFA-42	Possum Point Substation	Nest Box	1998	Y
VA-PEFA-43	Newport News City Hall	Nest Box	1993	Y
VA-PEFA-44	Elizabeth River Substation	Nest Box	1998	Y
VA-PEFA-45	Cargill Grain Elevator	Nest Box	1993	Y
VA-PEFA-46	Lafayette Bridge	Nest Box	1998	Y
VA-PEFA-47	North Elkins Shack	Nest Box	1994	-----
VA-PEFA-48	Churchland Bridge	Nest Box	1999	Y
VA-PEFA-49	Yorktown Substation	Nest Box	1998	Y
VA-PEFA-50	Jordan Bridge	Nest Box	1995	Y
VA-PEFA-51	Campostella Bridge	Nest Box	1998	Y
VA-PEFA-52	I-64 Bridge	Nest Box	1999	Y
VA-PEFA-53	ALCOA Bridge	Nest Box	1999	Y
VA-PEFA-54	I-295 Bridge	Nest Box	2001	Y
VA-PEFA-55	Dominion Building	Nest Box	2000	Y
VA-PEFA-56	River Front Plaza	Nest Box	2002	Y
VA-PEFA-57	BB&T Building	Nest Box	1984	Y
VA-PEFA-58	Russell Island Tower	Peregrine Tower	1982	-----
VA-PEFA-59	Bermuda Hundred	Nest Box	1998	Y
VA-PEFA-60	Chesapeake Bay Bridge	Nest Box	2004	Y
VA-PEFA-61	Tappahannock Bridge	Nest Box	2004	Y
VA-PEFA-62	Gull Marsh Tower	Peregrine Tower	2004	Y
VA-PEFA-63	Godwin Island Box	Nest Box	2004	Y
VA-PEFA-64	James River Ghost Ship 2	Moth Ball Fleet	------	Y

Table 2. Summary of productivity results for Peregrine Falcon pairs in Virginia during the 2008 breeding season.

Site code	Location Description	Occ Terr	Active Nest	Eggs	Chicks Hatched	Band Age	Fledged
PEFA-02	Cobb Island Tower	Y	Y	4	3	3[1]	?
PEFA-05	Metompkin Island Tower	Y	Y	4	≥2	2	?
PEFA-06	Wallops Island Tower	Y	Y	1+	0	0	0[2]
PEFA-07	Chincoteague Tower	Y	Y	3	0	0	0[3]
PEFA-09	Watts Island Tower	Y	Y	4	0	0	0
PEFA-10	Finney's Island Tower	Y	Y	4	4	4	1[4]
PEFA-12	Hyslop Marsh Tower	Y	Y	1+	0	0	0[5]
PEFA-17	Elkins Marsh Shack	Y	Y	4	4	4	4[6]
PEFA-18	Wachapreague Shack	Y	Y	4	4	4	
PEFA-22	James River Bridge	Y	Y	4	3	3	3[7]
PEFA-23	Berkley Bridge	Y	Y	5	2	2	2[8]
PEFA-24	Benjamin Harrison Bridge	Y	Y	4	4	4	4[9]
PEFA-25	Mills Godwin Bridge	Y	Y	4	3	3	3[10]
PEFA-27	Norris Bridge	Y	Y	4	4	4	4[11]
PEFA-34	Mockhorn Island Tower	Y	Y	3	2	2	?
PEFA-36	Upsher Bay Tower	Y	Y	4	3	3	?
PEFA-42	Possum Point Substation	Y	N	-----	-----	-----	-----
PEFA-50	Jordan Bridge	Y	Y	≥3	≥1	1	0[12]
PEFA-56	River Front Plaza	Y	Y	4	≥2	0	0[13]
PEFA-62	Gull Marsh Tower	Y	Y	4	4	4	1[14]
PEFA-63	Godwin Island Box	Y	Y	4	0	0	0[15]
PEFA-64	James River Ghost Ship 2	Y	Y	4	4	4	3[16]
Total		21	20	76	>45	47	

[1] 1 young sent to Wildlife Center of VA for toe injury caused by string. Died later from infection.
[2] Eggs predated by raccoon
[3] Eggs predated by raccoon
[4] 3 young translocated to Breaks Interstate Park and released but went missing. Presumed dead. 1 chick left at nest.
[5] Eggs predated by raccoon
[6] 2 young translocated to Shenandoah National Park and released. 2 chicks left at nest.
[7] 3 young translocated to New River Gorge and released.
[8] 2 young translocated to New River Gorge and released.
[9] 4 young translocated to Shenandoah National Park and released.
[10] 3 young translocated to Shenandoah National Park and released
[11] 4 young translocated to New River Gorge and released.
[12] Pair originally nested at Berkley Bridge. 1 chick hit by car on bridge.
[13] chicks died during hatching.
[14]3 young translocated to Breaks Interstate Park and released but went missing. Presumed dead. 1 chick left at nest.
[15]Eggs predated by unknown predator.
[16]4 young translocated to New River Gorge; only 3 released because 1 female had avian trichominasis.

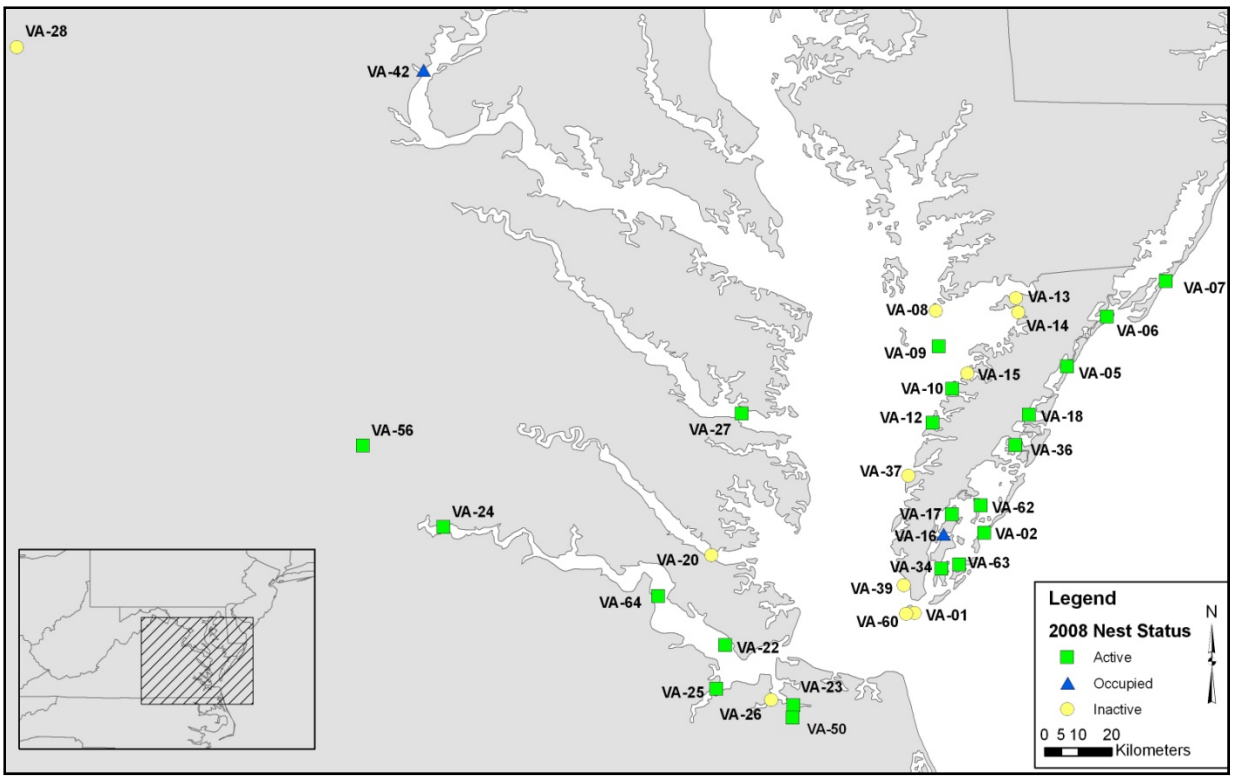


Figure 1. Map of nesting structures for Peregrine Falcons surveyed during the 2008 breeding season.

The 20 falcon pairs that made breeding attempts produced 76 eggs, at least 47 of which hatched. All of these chicks survived to fledging age. Fledging success was 2.2 chicks/occupied territory and 2.3 chicks/active territory. It should be noted that much of the chick production resulted from management actions taken during the breeding season. Twenty-eight (60%) of the 47 chicks produced were the result of translocations. Many of these birds would most likely have been lost if left in place.

During the 2008 breeding season, hatching and fledging rates were similar to recent years. Of 16 clutches that were followed completely from laying to fledging, 35 of 57 (61.4%) of eggs hatched. Of these 35 chicks, 33 (94.3%) survived to banding age and 25 (71.4%) fledged successfully.

Banding

All but two of the falcon chicks that survived to banding age were fitted with both FWS and alpha-numeric bands. This included 19 females and 28 males (Table 3). A male chick from Cobb Island tower was transported to a rehabilitation facility for a toe injury and was only banded with a FWS band on the uninjured leg. This chick later died from infection. A female chick at Metompkin Island tower was only banded with an alpha-numeric band.

Table 3a. List of band codes for female Peregrine Falcon chicks banded in Virginia during 2008 breeding season.

Band	A-N Band	Location	Date
1807-02768	62/Z	Norris Bridge	05/14/08
1807-02769	63/Z	James River Bridge	05/14/08
1807-02770	64/Z	James River Bridge	05/14/08
1807-02771	65/Z	Cobb Island Tower	05/21/08
1807-02772	67/Z	Elkins Marsh Shack	05/22/08
1807-02773	68/Z	Benjamin Harrison Bridge	05/22/08
1807-02774	69/Z	Benjamin Harrison Bridge	05/22/08
1807-02775	70/Z	Benjamin Harrison Bridge	05/22/08
1807-02776	66/Z	James River Ghost Ship 2	05/30/08
1807-02777	71/Z	Wachapreague Shack	06/03/08
1807-02778	72/Z	Finney's Island Tower	06/08/08
1807-02779	73/Z	Gull Marsh Tower	06/08/08
1807-02780	74/Z	Gull Marsh Tower	06/08/08
1807-02781	75/Z	Finney's Island Tower	06/08/08
1807-02782	72/Z	Upsher Bay Tower	06/17/08
1807-02783	76/Z	Upsher Bay Tower	06/17/08
1807-02784	78/Z	Mills Godwin Bridge	06/27/08
1807-02785	Z/20	Metompkin Island Tower	07/08/08
-----[1]	79/Z	Metompkin Island Tower	07/08/08

[1] Banded with only the alpha-numeric band.

Table 3b. List of band codes for male Peregrine Falcon chicks banded in Virginia during 2008 breeding season.

FWS Band	A-N Band	Location	Date
2206-81676	X/28	Berkley Bridge	05/05/08
2206-81677	X/29	Berkley Bridge	05/05/08
2206-81678	X/30	Norris Bridge	05/14/08
2206-81679	X/31	Norris Bridge	05/14/08
2206-81680	X/32	Norris Bridge	05/14/08
2206-81681	X/33	James River Bridge	05/14/08
2206-81682	X/34	Cobb Island Tower	05/21/08
2206-81683	---[1]	Cobb Island Tower	05/21/08
2206-81684	X/35	Elkins Marsh Shack	05/22/08
2206-81685	X/36	Elkins Marsh Shack	05/22/08
2206-81686	X/37	Elkins Marsh Shack	05/22/08
2206-81687	X/38	Benjamin Harrison Bridge	05/22/08
2206-81688	X/39	James River Ghost Ship 2	05/30/08
2206-81689	X/40	James River Ghost Ship 2	05/30/08
2206-81690	X/41	James River Ghost Ship 2	05/30/08
2206-81691	X/42	Wachapreague Shack	06/03/08
2206-81692	X/43	Wachapreague Shack	06/03/08
2206-81693	X/44	Wachapreague Shack	06/03/08
2206-81694	X/45	Gull Marsh Tower	06/08/08
2206-81695	X/46	Gull Marsh Tower	06/08/08
2206-81696	X/47	Finney's Island Tower	06/08/08
2206-81697	X/48	Finney's Island Tower	06/08/08
2206-81698	X/49	Mockhorn Island Tower	06/09/08
2206-81699	X/50	Mockhorn Island Tower	06/09/08
2206-81700	X/51	Upsher Bay Tower	06/17/08
1126-11801	X/52	Mills Godwin Bridge	06/27/08
1126-11802	X/53	Mills Godwin Bridge	06/27/08
1126-11803	X/54	Jordan Bridge	7/25/2008

[1] Chick had injury on one leg. Only banded with FWS band before transporting to rehabilitation center.

Translocations

Twenty-eight young falcons were translocated to be hacked during the course of the 2008 breeding season (Table 4). This included 12 females and 16 males. Sixteen of these chicks originated on bridges that have a history of poor fledging success. The remaining 13 chicks were from towers along the Delmarva Peninsula (8), and a ship in the James River Reserve Fleet (4).

Table 4. Summary of translocation activities for Peregrine Falcons in Virginia during the 2008 breeding season.

FWS Band	Hatch Site	Date Collected	Translocation Site
1126-11801	Mills Godwin Bridge	06/27/08	Shenandoah, NPS
1126-11802	Mills Godwin Bridge	06/27/08	Shenandoah, NPS
1807-02768	Norris Bridge	05/14/08	New River Gorge
1807-02769	James River Bridge	05/14/08	New River Gorge
1807-02770	James River Bridge	05/14/08	New River Gorge
1807-02772	Elkins Marsh Shack	05/22/08	Shenandoah, NPS
1807-02773	Benjamin Harrison Bridge	05/22/08	Shenandoah, NPS
1807-02774	Benjamin Harrison Bridge	05/22/08	Shenandoah, NPS
1807-02775	Benjamin Harrison Bridge	05/22/08	Shenandoah, NPS
1807-02776	James River Ghost Ship 2	05/30/08	New River Gorge[1]
1807-02779	Gull Marsh	06/08/08	Breaks Interstate Park
1807-02780	Gull Marsh	06/08/08	Breaks Interstate Park
1807-02781	Finney's Island Tower	06/08/08	Breaks Interstate Park
1807-02784	Mills Godwin Bridge	06/27/08	Shenandoah, NPS
2206-81676	Berkley Bridge	05/05/08	New River Gorge
2206-81677	Berkley Bridge	05/05/08	New River Gorge
2206-81678	Norris Bridge	05/14/08	New River Gorge
2206-81679	Norris Bridge	05/14/08	New River Gorge
2206-81680	Norris Bridge	05/14/08	New River Gorge
2206-81681	James River Bridge	05/14/08	New River Gorge
2206-81683	Cobb Island Tower	05/21/08	Wildlife Center of VA[2]
2206-81684	Elkins Marsh Shack	05/22/08	Shenandoah, NPS
2206-81687	Benjamin Harrison Bridge	05/22/08	Shenandoah, NPS
2206-81688	James River Ghost Ship 2	05/30/08	New River Gorge
2206-81689	James River Ghost Ship 2	05/30/08	New River Gorge
2206-81690	James River Ghost Ship 2	05/30/08	New River Gorge
2206-81695	Gull Marsh Tower	06/08/08	Breaks Interstate Park
2206-81696	Finney's Island Tower	06/08/08	Breaks Interstate Park
2206-81697	Finney's Island Tower	06/08/08	Breaks Interstate Park

[1]Diagnosed with frounce (avian trichomoniasis) and under medical treatment at Three Rivers Avian Center, WV.
[2]Toe injury resulted in foot amputation. Died later from a systemic infection from the injury.

The birds removed from towers were taken from one of the highest density breeding areas in Virginia and where concern for the impact of peregrines on beach and colonial nesting birds is the highest. The nest site chosen on the reserve ship was in a doorway that was lower than the surrounding structure making it unlikely that the birds could fledge without falling into the water.

Birds collected from territories were transported to Hawksbill in Shenandoah National Park, the New River Gorge, and Breaks Interstate Park. Nine birds were hacked at Hawksbill, 13 at the New River Gorge, and 6 at Breaks Interstate Park. A second-year male released in the 2007 SNP hack (color band X/02, Watts Island tower) hung around the SNP hack site and assisted the 2008 young in defending the hack site from turkey vultures and ravens. He was frequently seen perched and interacting with a female from one the hack groups. All 6 falcons at Breaks went missing shortly after release in late June. Unconfirmed sightings of peregrines in the area suggest the possibility of a territorial bird with unknown breeding status.

During the 2008 season, 14 addled eggs were collected and transported to be analyzed for contaminants in Rob Hale's lab at the Virginia Institute of Marine Science (Table 5).

Table 5. Addled eggs collected from Virginia Peregrine Falcon nests for contaminants analysis during the 2008 breeding season.

Site code	Location description	No. Eggs
VA-PEFA-02	Cobb Island Tower	1
VA-PEFA-09	Watts Island Tower	4
VA-PEFA-22	James River Bridge	1
VA-PEFA-23	Berkley Bridge	3
VA-PEFA-24	Benjamin Harrison Bridge	1
VA-PEFA-25	Mills Godwin Bridge	1
VA-PEFA-36	Upsher Bay Tower	1
VA-PEFA-50	Jordan Bridge	2

DISCUSSION

The Virginia breeding population of Peregrine Falcons increased by approximately 5% between 2007 and 2008. This increase reflects the arrival of the first pair of falcons at Dominion's Possum Point power plant in northern Virginia.

The reproductive rate measured in 2008 was slightly lower than in 2008 when productivity was the highest since 1988. The hatching rate in 2008 dropped 13% from the previous year. This was a direct result of the depredation of 4 nests during the incubation stage. The fledging rate also decreased because of the loss of 6 birds at the hack site at Breaks Interstate Park and 2 birds with medical conditions.

The use of coastal productivity to fuel targeted hacks in priority sites is consistent with the objective of re-establishing a viable breeding population within the historic mountain range of Virginia. Fledging rate from the 7 bridge sites in the coastal plain has been very low. The translocation of these birds to the mountains is a good use of this production. Over the past decade, pairs along the lower Delmarva Peninsula have

increased to a very high breeding density. This population exists completely on artificial structures and has been highly productive. Diet within this system is dominated by migrant shorebirds and nesting waterbirds that are themselves of conservation concern (Long, unpublished data). In recent years, concern about the impact of this breeding population on the management of waterbirds has increased. The management strategy initiated in 2006 to utilize productivity along the Delmarva to fuel targeted hacks in the mountains was continued in 2008. This strategy meets the objective of both repopulating the mountain range and reducing impacts to sensitive waterbirds.

The second largest number of birds ever translocated in the state was moved from the coast to the mountains during the 2008 breeding season. A total of 28 birds representing more than 60% of the total production was moved to the mountains and released. As in 2007, birds were hacked from Hawksbill in Shenandoah National Park, New River Gorge National River, and Breaks Interstate Park. Efforts in future years should continue to support the establishment of a breeding pair within these three sites and should establish the infrastructure and partnerships necessary for at least 1 additional hack site in Virginia.

Nesting on natural cliff sites continues to be precarious. The 2005 breeding season was the first year since the late 1990s that a pair made a breeding attempt in the mountains. In 2006 the pair chose a fairly exposed shelf to lay and the clutch was washed out during a spring storm. The problems of exposure and drainage have caused nest failures within other Virginia mountain sites during the 1990s. In 2007, the pair laid 2 clutches that were predated. This cliff site was abandoned and remained inactive through the 2008 breeding season. This intensive management approach should continue in the future when feasible until the mountain population is self sustaining.

During the 2008 season, 14 addled eggs were collected and transported to be analyzed in Rob Hale's lab at the Virginia Institute of Marine Science. This transfer represents a continuing effort to monitor contaminant levels in Virginia peregrines and to continue to explore the potential for this species to accumulate brominated fire retardants that remain on the market.

ACKNOWLEDGMENTS

A number of individuals and organizations contributed to the 2008 monitoring and management effort. The Virginia Department of Game & Inland Fisheries and the Center for Conservation Biology provided financial support for the project. Jeff Cooper, Sergio Harding and Ray Fernald provided regulatory oversight to the project. This project would not have been possible without the continued assistance and cooperation from the Virginia Department of Transportation. We thank Steve Long for his continued support. We also thank Jack Meredith and Mike Dangerfield and the many bridge tenders and equipment operators for their expertise and assistance. We thank The Nature Conservancy's Virginia Coast Reserve for continued cooperation with the island towers. Joel Mitchell and others from NASA Wallops assisted with the management of

the Wallops Island pair. Joelle Buffa and others monitored the Chincoteague Island nest. Martin Walker assisted with the management of the pair of birds on the James River Reserve Fleet. Jeff Marcell and George Newsome from Dominion assisted with accessing the Possum Point nest box. Mike Boron and staff assisted with the Jordan bridge nest. The National Park Service has had a long history of supporting the re-introduction of falcons in the mountains and played a critical role in managing the hack site at Shenandoah National Park and the new site at New River Gorge. Rolf Gubler and Kim Miller coordinated the hack at Hawksbill Mountain. Carl Mullins and Terry Owens coordinated the hack at Breaks Interstate Park. We thank the interpretive staff of the Byrd Visitor Center for their support of the project. Wendy Perrone and staff from Three Rivers Avian Center, Matthew Varner from New River Gorge (NPS), and Craig Stihler from WV DNR managed the hack at New River. Catherine Markham built the website to host the 4 webcams that were operated during the 2008 season. Mitchell Byrd, Fletcher Smith, Dave Fuller, Barton Paxton, Carla Schneider, Adam Duerr, and Jake McClain assisted in the field. John Porter from UVA, Allen Williams from Shenandoah National Park, and Oscar Land from the Whitlock Group helped to install local equipment or provide technical assistance in establishing web links. Mike Ludwick, Carlton Adams, Renee Peace, Cheryl Pope, Mark Roberts, Gloria Sciole, and Bonnie Willard provided administrative assistance from the College of William and Mary.

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